Claims

1. A method for controlling the position and/or force of an elongated rolling device in the roll nip (N) between two elongated rolling devices in paper and board machines, whereby

- the position of the rolling device relative to the other rolling device and/or the force exerted by the rolling device on the other rolling device or any variable acting on these is measured and the value of the measured variable is compared with the set value of said variable in order to obtain the difference value of the variable,

- on the basis of the difference value of the variable, the position of the rolling device and/or the force it exerts on the other rolling device is adjusted, **characterised** in that

- the fluid pressure of the hydraulic means (5) and/or the flow rate of the fluid to the hydraulic means is changed in order to alter the difference value of the variable by stepwise opening and/or closing at least one digital valve in a digital valve pack (7) functionally connected to the hydraulic means (S).

2. A method as defined in claim 1, **characterised** in

- measuring the force (F) exerted by the first rolling device on the other rolling device or the pressure it generates in the roll nip (N) between the pair of rolling devices (2) and comparing the measured value of the variable with the set value of the same variable in order to obtain the digital difference value,

- opening selected digital valves of the digital valve pack (1), whose flow volume achieves a decrease of the difference value, on the basis of the digital difference value.

3. A method as defined in any of the preceding claims, **characterised** in

- measuring the position of the first rolling device (21) in the roll nip relative to the other rolling device (22), and comparing the measured variable value with the set value of the same variable in order to obtain the difference value of the variable,

- opening selected valves of the digital valve pack (7), whose flow volume achieves a decrease of the difference value at the desired rate.

4. An arrangement (1) for controlling the position and/or force of an elongated rolling device (21) in the roll nip (N) between two elongated pairs of rolling devices (2) in a paper and board machines, the arrangement (1) comprising

- a measuring means (4) for measuring the position and/or force of the rolling device (21) or any variable acting on these and for transmitting a measurement signal (41) to the control system (3),

- a hydraulic means (5) for changing the position and/or force of the rolling device in the roll nip (N),

- a switch means (7) for regulating the volume flow to the hydraulic means,

- a control system (3) for receiving a measurement signal (41) and for comparing the information contained in the measurement signal with the set value of the variable in order to generate a control signal (31) and to transmit it to the switch means (7),

characterised in that the switch means (7) comprises

- receive means for receiving and processing a control signal (31),

- at least one digital valve pack (7) comprising digital valves, which can be switched stepwise on and off on the basis of the control signal (31), so that the fluid pressure in the hydraulic means (5) and/or the flow rate of the fluid to the hydraulic means (5) is changed.

5. An arrangement as defined in claim 4, **characterised** in that the fluid flow to the hydraulic means (5) is changed with the aid of the digital valve pack (7), the volume flow through the valves of the digital valve pack being doubled each time it passes from the first valve to the second valve of two valves having consecutive volume flow rates.

6. An arrangement as defined in claim 5, **characterised** in that the measuring means (4) generates an analogue measurement signal (41), which the control system (3) converts into a digital control signal (31) and transmits said digital control signal to the digital valve pack (7) that changes the volume flow of the hydraulic means (5).

7. An arrangement as defined in claim 6, **characterised** in that the measurement signal (41) contains information about the position of the rolling device (21) in the roll nip (N) between the roll pair (2) formed of two rolling devices (21, 22) and/or the force exerted by the rolling device on the other rolling device in the roll nip, the control system (3) generating the digital difference value on the basis of the measurement signal (41) and transmitting a digital control signal (31) based on the difference value to the switch means, which is a digital valve pack (7).

8. An arrangement (1) as defined in claim 6 or 7, **characterised** in that the control signal (31) received by the digital valve pack (7) is in digital form, on/off digital valves of the digital valve pack (7) being closed and opened on the basis of the digital control signal without changing the control information contained in the control signal into analogue form in the meantime.

9. An arrangement (1) as defined in any of claims 4 to 8, **characterised** in that the position of the first rolling device (21) relative to the other rolling device (22) and the force (F) exerted by said first rolling device on the other rolling device is controlled with the same hydraulic means (5) and the volume flow rate and velocity of said hydraulic means are changed by means of one or more digital valve packs (7).

10. An arrangement as defined in any of the preceding claims 4 to 9, **characterised** in that the measuring means (4) serves to measure the amplitude (A) and frequency (f) of the vibration of the rolling device in the roll nip (N) between the pair of roll nips (2) formed of two rolling devices (21, 22), the control system (3) serves to determine the difference value inverse to the vibration of said rolling device and to generate a control signal (31) based on the difference value, that the volume flow rate of the hydraulic means (7) is changed by opening and closing selected digital valves of the digital valve pack (5) on the basis of the control signal (31) in a phase opposite to the vibration detected in the rolling device.

11. An arrangement (2) as defined in claim 10, in which the rolling device (21, 22) are rolls, **characterised** in that

- the control system (3) generates and transmits a control signal (31) to the digital valve pack (7) on the basis of the set value of the amplitude and frequency of the detected vibration, one or more digital valves in the digital valve pack being opened and closed on the basis of the control signal so that the volume flow of the hydraulic fluid to the hydraulic means (5) generates a counter-vibration to the vibration occurring in the roll.

12. An arrangement (1) as defined in claim 11, **characterised** in that the switch means (7) additionally includes analogue valves, by means of which most of the controls of the position of the roll and/or of the force it exerts on the other roll are performed in the roll nip (n).

13. An arrangement (1) as defined in any of the preceding claims 4 to 12, **characterised** in that the switch means (7) has two digital valve packs, the hydraulic fluid pressure generated by the digital valve packs in the hydraulic means opening and closing the roll nip (N) between two rolls.

14. An arrangement (1) as defined in claim 13, **characterised** in that the hydraulic means (5) is a hydraulic cylinder, the magnitude of the fluid pressure of the cylinder portion (51; 51a) located on the first side of its piston head (52; 52a) being adjusted with a first digital valve pack and the magnitude of the fluid pressure of the cylinder portion (51; 51b) on the other side of the piston head being adjusted with another digital valve pack.

15. An arrangement (1) as defined in claim 14, **characterised** in that the roll nip (N) is rapidly opened by opening all of the on/off digital valves in the first digital valve pack (7).

16. An arrangement (1) as defined in any of the preceding claims 4 to 15, comprising

- a first rolling device (21) having a reel core, about which the fibre web (W) is reeled, and a second rolling device (22), which is a reel cylinder, on whose surface

the reeled fibre web is fed into the roll nip (N) located between the reel core and the reel cylinder,

- a hydraulic means (5), allowing a change of the nip pressure in the roll nip (N), the hydraulic means (5) being functionally connected to the reel core (21) of the reeler (9), said hydraulic means (5) allowing additionally a shift of the position of the reel core relative to the reel cylinder,

- measuring means (4) for measuring the force (F) exerted by the reel core (21) on the reel cylinder (22) in the roll nip and the position of the reel core (21) relative to the reel cylinder (22),

- a control system (3) for determining the difference between the measured propulsive force and the set value of the propulsive force and/or the difference between the measured value and the set value of the distance between the reel cylinder (22) and the reel core (21), **characterised** in that the arrangement (1) comprises a switch means (7) containing one or more digital valve packs, stepwise opening and closing of the digital valves of the digital valve packs allowing control of the fluid pressure of the hydraulic means by means of control signals (31) from the control system (3) so that the difference between the measured propulsive force and the set value of the propulsive force and/or the difference between the measured value and the set value of the distance between the reel cylinder (22) and the reel core (21) decreases.

17. An arrangement (1) as defined in claim 16, **characterised** in that the arrangement also comprises a measuring means (4) for detecting the amplitude (A) and the frequency (f) of the reel core (21) and the control system (3) determines the counter-vibration of the vibration occurring in the reel core, the counter-vibration being incorporated in the control signal (31) and transmitted to the digital valve pack (7) for stepwise opening and closing selected digital valves in a phase opposite to the vibration detected in the reel core.

18. An arrangement (1) as defined in any of the preceding claims 4 to 15, in which the first and the second rolling device are coating rolls, the coating agent or coating paste passing onto one or both sides of the fibre web in the roll nip (N) between the coating rolls.

19. An arrangement (1) as defined in claim 18, further comprising an application means, with the aid of which the coating agent or coating paste is applied to the surface of the coating roll or of endless belt rotating about the coating rolls.

20. An arrangement (1) as defined in any of the preceding claims 4 to 15, in which the first and the second rolling device are rolls of a multinip calender (20) and load reduction means are provided at least at the end of one roll, **characterised** in that one ore more digital valve packs are used for controlling a hydraulic actuator (5) provided at the ends of the roll, the hydraulic actuator compensating loads caused by the auxiliary means of the roll.

21. An arrangement (1) as defined in claim 20, **characterised** in that one or more digital valve packs (7) serve to additionally control hydraulic actuators (5; 51) within the roll for pressurising different zones of the roll mantle.

22. An arrangement (1) as defined in claim 20 or 21, **characterised** in that one or more digital valve packs (7) serve to additionally control the operation of hydraulic cylinders (5; 52) provided at the ends of the roll, the hydraulic cylinders opening and closing roll nips (N) of a multinip calender (20) and changing the nip pressures of said multinip calender.

23. An arrangement (1) as defined in any of claims 4 to 15, in which the first and the second rolling device are rolls (23) having load means (5; 51) within the roll, **characterised** in that the operation of said load means is controlled with one or more digital valve packs (7).

24. An arrangement (1) as defined in any of claims 4 to 15, **characterised** in that the first rolling device is equipped with a blade and that the hydraulic actuator (5) controlling the nip pressure of the roll nip between the first and the second rolling device is controlled by means of one or more digital valve packs.